and that when a dielectric like resin is interposed in its path, some of the characteristics of the form into which the electrified air has been thrown are transferred to the resin surface as an electric charge, generating the stresses and other inductive effects which result in the dust and stress figures.

Experiments corresponding to those described made in an atmosphere of carbonic acid gas at normal atmospheric pressure, and in air at pressures lower than the normal, show that the character of the figure imprinted on a dielectric in receiving an electric charge through a gaseous medium is largely dependent on the density of the atmosphere conveying the charge; greater density tending to concentration of the figure and attenuation to diffuseness. With an air pressure supporting 85 mm. of mercury, the other conditions being such as would have given at normal pressure a characteristic + star figure, there was diffuse electrification of the resin surface, but there were no rays.

"On the Brains of two Sub-Fossil Malagasy Lemuroids." By C. I. Forsyth Major. Communicated by Henry Woodward, LL.D., F.R.S., V.P.G.S. Received April 6,—Read June 3, 1897.

(Plate 5.)

The casts here described and figured have been moulded from the brain-cavities of the skulls of two sub-fossil Lemuroids from Madagascar, the descriptions of which I have already published. For comparison with the brains of living Lemuroids the figures published by P. Gervais* are the best adapted for the *present* purpose, since they, too, are drawn from moulds of the brain cavity, and give on one plate a good general idea of the variations of the Lemur brain.

1. *Globilemur Flacourti*, Maj.

The larger of the two casts was taken from the skull briefly described by me at the meeting of the Zoological Society of London, June 20, 1893.†

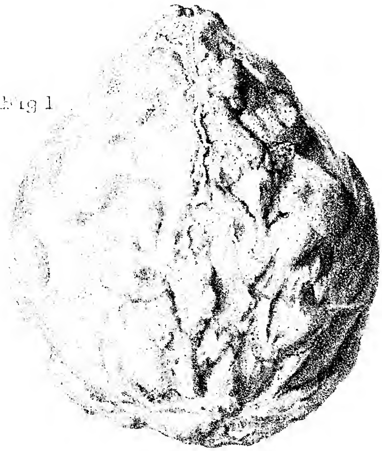
In its general contours, as viewed from above (fig. 1), the brain of this form, for which I now propose the name of *Globilemur Flacourti* (*g. n. et sp. n.*), approaches most to that of the smallest members of the family (Lemuridæ), viz., *Microcebus*,‡ both being remarkably broad

* Paul Gervais, "Mémoire sur les formes cérébrales propres à l'ordre des Lémurs, accompagné de remarques sur la classification de ces animaux," 'Journal de Zoologie,' vol. 1, 1872, pp. 5—27, Pl. 2.

† 'Zool. Soc. Proc.,' 1893, pp. 532—535.

‡ P. Gervais, *loc. cit.*, fig. 7, Pl. 2.

Fig 1



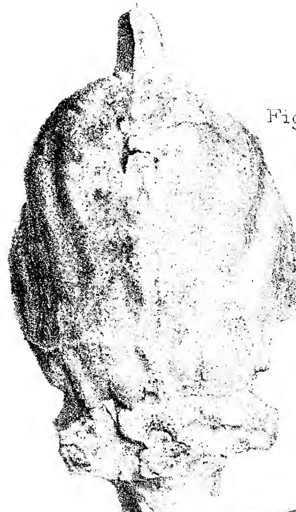
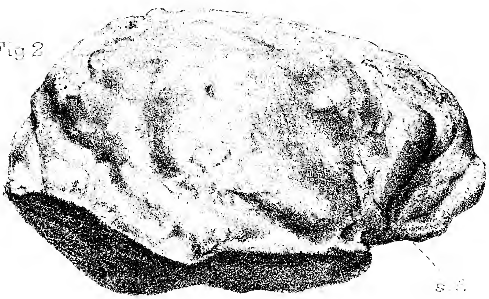


Fig. 4.

Fig. 8.

Fig 2



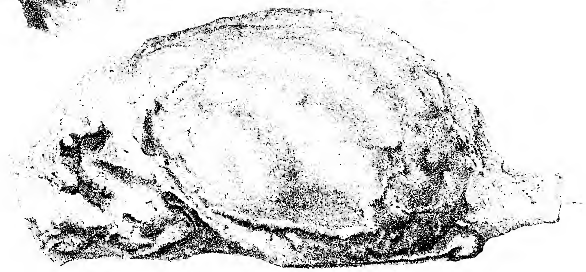
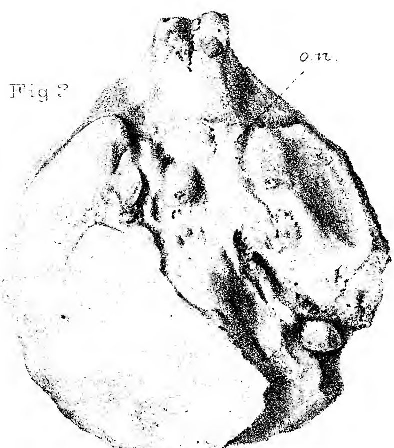


Fig. 5.

Fig 3



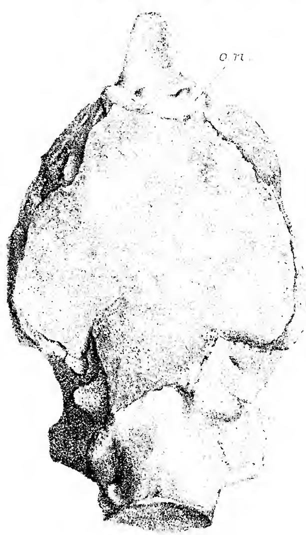


Fig. 6.

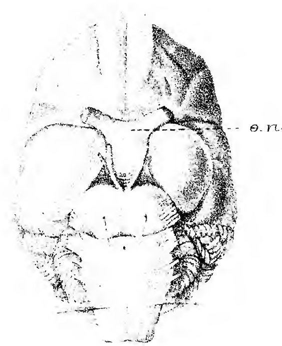


Fig. 7.

West, Newman lith.

in their posterior moiety and suddenly attenuated anteriorly. Apart from the Sylvian fissure, the brain surface of *Microcebus* is perfectly smooth, whilst the cast of the fossil shows a greater complication than in any other known Lemurid. This is in accordance with what might have been anticipated, *Globilemur* being larger than any living Lemurid, and, as Broca states : " *Un cerveau qui grandit doit se plisser sous peine de déchoir** " ; this, in my opinion in fact, means that for economy of space plication is resorted to as a means of increasing the surface.

In the arrangement of its convolutions (fig. 2), the fossil departs likewise from what is known of Lemurid brains, and approaches rather more to what is presented by some of the larger *Cebidæ* and *Cercopithecidæ.* In Lemurids the fissures and the corresponding convolutions show a tendency towards a longitudinal arrangement, quite different from the more radiating direction exhibited by the fossil. Its Sylvian fissure (*s.f.*), on the other hand, corresponds in its more vertical direction to what we find in Lemurids, and in this respect departs more from the Old and New World monkeys, though less from the former than from the latter. The character mentioned is in relation with the development of the occipital lobe, the Sylvian fissure being always more horizontally directed in those brains in which the occipital lobe is well developed and in which, as a consequence, the cerebellum is covered. In fact, in *Globilemur*, the cerebellum is much less overlapped than in the monkeys.

In the lesser development of the frontal lobes we find a further agreement with Lemurids as compared with monkeys, and equally so in the more macrosmatic character of the brain of *Globilemur*, as revealed by its voluminous olfactory lobes.

I shall not enter into farther particulars as it is never safe to attempt to make out the exact homologies of the fissures in a cast of the brain cavity. Moreover, in this case, I find that the two sides of the hemispheres do not agree in every respect, owing partly to the incomplete condition of the skull and partly to the difficulties encountered by the artist in the moulding.

II. *Megaladapis madagascariensis*, Maj.

The second cast, from the brain-cavity of *Megaladapis madagascariensis*, is in many respects the very opposite of *Globilemur*. First, as to size,—from the dimensions of the respective skulls, the size of the first named animal (*Megaladapis*) may be approximately calculated as double that of the last (*Globilemur*), whilst in bulk the brain

* Paul Broca, "Anatomie comparée des Circonvolutions Cérébrales. Le grand lobe limbique et la scissure limbique dans la série des Mammifères," 'Revue d'Anthropologie,' II, vol. 1, 1878, p. 413.

of the smaller animal exceeded that of *Megaladapis*. So far as can be judged from the cast (fig. 4), the hemispheres were much less convoluted than in the large existing recent Lemurids, their fore- and hind-parts being apparently almost smooth in the fossil form.

The reduced proportions of, or, more properly speaking, the absence of, the occipital lobe, is testified by the cerebellum remaining uncovered.

But the most remarkable character is exhibited by the anterior beak-like continuation of the hemispheres (fig. 5, *b*), which presents in section a triangular form with a broad, flattened base and a trenchant superior margin. The corresponding part of the skull has been elsewhere described,* when it was shown that the corresponding constriction of the brain cavity is due to the enormously developed frontal sinuses protruding into the anterior portion of the cerebral and olfactory fossæ.

The optic nerves will help us by indicating the orientation in this curiously shaped brain (fig. 3 and fig. 6). From a comparison of the inferior part of the brain of *Megaladapis* with that of an *Indris* (fig. 7), it will be seen that in the former the frontal lobes are absent, and the part of the hemispheres situated in front of the optic nerves is represented by scarcely anything but the posterior part of the before-mentioned beak (fig. 6, *b*), which continues anteriorly to form the olfactory tract which is equally reduced. Even in crocodiles (fig. 8), the fore part of the hemispheres, anterior to the optic nerves, appears less reduced than in this Mammal.

Little information can be obtained as to the anterior portion of the tractus and the bulbi, as it was not possible to mould this portion of the narrow channel running between the internal walls of the frontal sinuses; nor could this unique skull be bisected. As far as can be made out, the canal in question widens in proximity to the cribriform plate, so as to form the chambers for the lodgment of the olfactory bulbs.†

* "On *Megaladapis madagascariensis*, an extinct gigantic Lemuroid from Madagascar, &c.," 'Phil. Trans.,' B, vol. 185, 1894, pp. 25, 26.

† A somewhat similar conformation obtains in the Whales, to which my attention has been drawn by Sir William Flower, who described it in *Balæna mysticetus*, where "the two somewhat dilated chambers for the olfactory bulbs are divided from the cerebral cavity by a canal which runs for a distance of 8½ inches and is 1½ inches wide and from ½ to 1 inch high." 'On the Greenland Right-Whale (*Balæna mysticetus*),' by D. F. Eschricht and I. Reinhardt; Appendix by the editor, William Henry Flower, London, Ray Society, 1866; W. H. Flower, 'An Introduction to the Osteology of the Mammalia,' 3rd ed., London, 1885, p. 220. See also Ant. Desmoulins, 'Dict. Class. d'Hist. Nat.,' vol. 6, 1824, p. 372, s. v. "Évent" (*Balæna australis*); F. Cuvier and Laurillard, in 'Cuvier, Leçons d'Anat. Comp.,' seconde édit., vol. 2, 1837, p. 305 (*Balænoptera*); Otto Köstlin, 'Der Bau des knöchernen Kopfes in den vier Klassen der Wirbelthiere,' Stuttgart, 1844, pp. 16, 17, 18, 89 (*Balæna australis—Balænoptexa borealis*).

As has been pointed out in the description of the skull of *Megaladapis*,* its post-orbital region is remarkably elongate in the lateral parts, in a manner quite unusual amongst Lemuroidea, and for parallels of which we have to look amongst *Carnivora*, and especially *Insectivora* (*e.g.*, *Centetes*). An external and superficial examination of the skull might lead to the belief that this elongation has resulted in an anterior elongation of the brain-cavity as well. But as we have just seen, in *Megaladapis* the elongation in question is brought about by the development of air sinuses, whilst the cranial cavity is on the contrary shortened, as well as narrowed.

Although in this skull the sutures are almost entirely obliterated, it is obvious that in the elongation of the lateral parts of the post-orbital region, the orbits and the alisphenoids participate as well as the frontals. This is well shown by the fact that, whilst in Lemurids generally, as well as in monkeys, the passage for the optic nerves from the internal cavity to the orbits, of which we speak as the optic *foramen*, is a very short one—very oblique in the former, almost parallel in the latter,—we find in *Megaladapis* that the second pair of nerves traverse a canal of no less than 24·3 mm. length, before appearing at the outer side of the skull, in the orbits. So that, in lieu of a *foramen opticum*, we have here a *canalis opticus*. The united *foramina rotundum* and *lacerum anterius* form likewise a canal of about 21·5 mm. length.

When describing the skull of *Megaladapis*, I endeavoured to show that its peculiar low condition is not primitive, but *pseudo-primitive* (Fürbringer), that is to say, that it has been brought about by a "retrogressive evolution," or a retrograde metamorphosis, if the last term be preferred. If any further proof were needed for this assertion, it would be furnished by the conformation of the brain, as described above, for I trust that no anatomist will maintain that this was the primitive condition in Lemuroids. It may fairly be predicted that, when we come to know the skulls of very young specimens of *Megaladapis*, they will show a much closer approach to the ordinary Lemurid type in the conformation of the brain cavity and its walls, and the gap between the young and the adult in this respect will prove to be wider than perhaps in any other known Mammal. However, in the Insectivora and most of all in *Centetes*, we find also a very great difference between young and adult in the relative size and conformation of the brain (the brain being even *absolutely* smaller in the old), whilst the least divergence is to be found in Marsupials on the one side, in Man on the other, and this obviously for opposite reasons.

Apart from what has been pointed out about the analogy of *Megal-*

* *Loc. cit.*, p. 16.

adapis with the Whales, in the elongation of the anterior part of the brain-cavity, corresponding to the *tractus*, no instance of a similar reptilian-like conformation of the brain is known to me amongst Mammalia, if I except the *Amblypoda*, especially the *Dinoceratidæ*, the brain of which "was proportionally smaller than in any other known Mammal, recent or fossil, and even less than in some reptiles. It was, indeed, the most reptilian brain in any known Mammal. . . . The cerebral hemispheres did not extend at all over the cerebellum or the olfactory lobes."*

EXPLANATION OF PLATE.

FIGS. 1—3.—Figures of cast of brain-cavity of *Globilemur Flacourti*, Major, Pleistocene, near Nossi-Vé, S.W. Madagascar. Original specimen preserved in the British Museum (Natural History). 2/3rds natural size.

FIG. 1.—View of brain, seen from above.

„ 2.—Side view of same (*s.f.*, Sylvian fissure).

„ 3.—View of same, seen from beneath (*o.n.*, optic nerve). All drawn 2/3rds natural size.

FIGS. 4—6.—Figures of cast of the brain-cavity of *Megaladapis madagascariensis*, Major (2/3rds natural size); Pleistocene, Amboulisatra, S.W. Madagascar.

FIG. 4.—View of brain, seen from above (*b*, beak-like projection in front).

„ 5.—Side view of same.

„ 6.—View of same, seen from beneath (*o.n.*, optic nerve). All drawn 2/3rds natural size.

FIG. 7.—Brain of *Indris* (seen from beneath), recent (*o.n.*, optic nerve); copied from Grandidier.

„ 8.—Brain of Alligator (seen from beneath), recent (*o.n.*, optic nerve).

"On the Occlusion of Oxygen and Hydrogen by Platinum Black. Part II." By LUDWIG MOND, Ph.D., F.R.S., WILLIAM RAMSAY, Ph.D., F.R.S., and JOHN SHIELDS, D.Sc., Ph.D. Received July 21, 1897.

(Abstract.)

The heat of occlusion of hydrogen in platinum black was determined by saturating the platinum black with hydrogen, extracting as much of this as possible at 184° C. by means of the pump, and then readmitting it again whilst the experimental tube was placed in an ice calorimeter. By proceeding in this way, errors due to the preexistence of oxygen in the platinum black were avoided, and it was

* O. C. Marsh, "Dinocerata. A Monograph of an extinct Order of gigantic Mammals," 'Monographs of the United States Geological Survey,' vol. 10, Washington, 1886, pp. 53, 54.

Fig 1

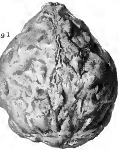


Fig 2

Fig 3

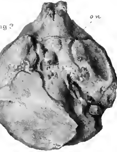


Fig 4

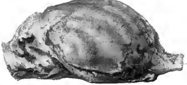


Fig 5

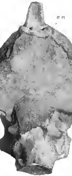


Fig 6

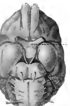


Fig. 7.

Fig 8